CLAIMS

I claim:

1. A process for reducing microorganisms in a conductive medium, which comprises subjecting the medium containing microorganisms to low voltage pulsed electrical energy, the low voltage pulsed electrical energy being generated by a pair of electrodes contacting the medium and having a defined voltage, the low voltage pulsed electrical energy having a defined frequency and defined waveform, wherein the pulsed electrical energy forms no free radicals, creates no osmotic shock, and generates no ionizing radiation, wherein the pulsed electrical energy causes no detrimental change to the conductive medium, and wherein the pulsed electrical energy reduces the microorganisms in the medium, provided that the conductive medium is not a pumpable food or beverage.

2. The process according to claim 1, wherein the conductive medium is blood.

3. The process according to claim 1, wherein the conductive medium is a conductive solid.

4. The process according to claim 1, wherein the conductive medium is a liquid or gas containing contaminated solids which are suspended or immersed in the liquid or gas.

5. The process according to claim 1, wherein the frequency of the pulsed electrical energy is in a range of 1 to 1000 pulses per second.

6. The process according to claim 1, wherein the frequency of the pulsed electrical energy is about 120 per second.

7. The process according to claim 1, wherein the pulse waveform has a shape which is a monopulse in the positive domain.

8. The process according to claim 1, wherein the pulse waveform has an amplitude in a range of 6,000 V to 15,000 V.

9. The process according to claim 8, wherein the pulse amplitude is about 12,000 V.

10. The process according to claim 1, wherein the microorganisms in the conductive medium are reduced by about 5 log or more after treatment.

11. The process according to claim 1, wherein the medium containing microorganisms is subjected to the electric energy pulse while the medium is passed through a treatment space.

12. The process according to claim 11, wherein the medium is passed through the treatment space at a flow rate of 1 to 300 gallons per minute.

13. The process according to claim 12, wherein the flow rate of medium is in a range of 15 to 25 gallons per minute.

14. The process according to claim 11, wherein the treatment space is equipped with one or more pairs of electrodes connected to one or more pulser units for generating an electrical energy pulse.

15. The process according to claim 11, wherein the treatment space is equipped with two or more pairs of electrodes connected to two or more pulser units for generating two or more respective electrical energy pulses.

16. The process according to claim 15, wherein the two or more electric energy pulses generated by the two or more pairs of electrodes connected to two or more respective pulser units have a different pulse frequency, different pulse shape, and/or different pulse amplitude, for the treatment of one, two or more different types of microorganisms

contained in the medium.

17. The process according to claim 15, wherein the two or more pulser units subject the microorganisms contained in the medium to different levels of applied energy.

18. The process according to claim 11, wherein the medium is passed through a plurality of two or more treatment spaces, each treatment space being equipped with at least one pair of electrodes connected to at least one pulser unit for generating an electrical energy pulse.

19. The process according to claim 11, wherein the treatment space is within a conduit.

20. The process according to claim 11, wherein the treatment space is within a chamber.

21. The process according to claim 1, wherein the low voltage pulsed electrical energy subjects the microorganisms to an applied energy of less than or up to 1 joule per milliliter.

22. The process according to claim 1, wherein the flow rate is less than 1 gallon per minute.

23. The process according to claim 1, wherein the low voltage pulsed electrical energy subjects the microorganisms to an applied energy of greater than 1 joule/ml.

24. A process for killing a specific target microorganism in a conductive medium, which comprises

(a) subjecting the medium containing the specific target microorganism to an electric energy pulse having a predetermined pulse waveform and predetermined pulse frequency, thereby subjecting the microorganism to a predetermined applied energy,

(b) measuring the effectiveness of the electrical energy pulse on killing the microorganism,

(c) adjusting one or more of the pulse waveform, pulse frequency, or applied energy of the electric energy pulse,

(d) subjecting the medium containing the microorganism to the adjusted electric energy pulse,

(e) measuring the effectiveness of the adjusted electric energy pulse on killing of the microorganism, and

(f) optionally repeating steps (c), (d) and (e) to determine the optimum pulse waveform, pulse frequency and applied energy to kill the microorganism provided that the conductive medium is not a pumpable food or beverage.

25. The process according to claim 24, wherein the medium containing the microorganism is subjected to the electric energy pulse by passing the medium containing the microorganism through an energy pulser treatment space at a predetermined flow rate.

26. The process according to claim 25, wherein the flow rate of the medium containing the microorganism is also adjusted to optimize killing the microorganism.

27. The process according to claim 24, wherein the specific target microorganism is a member selected from the group consisting of *Listeria, Clostridium, Salmonella, Lactobacillus, Endotoxin, E. coli, Aspergillus niger, Penicillium, Streptococcus, Bacillus and Klebsiella.*

28. An apparatus for the treatment of a conductive medium containing microorganisms, which comprises a first conduit for passing the conductive medium therethrough, said

first conduit connected in flow path arrangement to a treatment space for passing the conductive medium into the treatment space, the treatment space being equipped with an electric energy pulser for treating the microorganisms with an applied energy, and a second conduit connected in flow path arrangement to the treatment space for passing the treated medium out of the treatment space, wherein the conductive medium is not a pumpable food or beverage.

29. The apparatus according to claim 28, wherein the first conduit is equipped with at least one sensor for monitoring the pH, pressure, temperature, conductivity and/or flow rate of the conductive medium.

30. The apparatus according to claim 28, wherein the second conduit is equipped with at least one sensor for monitoring the pH, pressure, temperature, conductivity and/or flow rate of the conductive medium.

31. The apparatus according to claim 28, wherein the electric energy pulser is equipped with at least one sensor for monitoring the current, voltage, pulse shape and/or pulse frequency.

32. The apparatus according to claim 28, wherein the treatment space is within a conduit or chamber.

33. The apparatus according to claim 28, which includes at least one control for adjusting the pulse frequency, pulse shape, pulse amplitude or pulse voltage.

34. A conductive medium which is treated by the process according to claim 1, provided that the conductive medium is not a pumpable food or beverage.

35. The conductive medium according to claim 34, which is blood, wastewater, a conductive

solid or a suspended solid.

36. A conductive medium which is treated by the process according to claim 24, provided that the conductive medium is not a pumpable food or beverage.

37. The conductive medium according to claim 36, which is blood, wastewater, a conductive solid or a suspended solid.

38. A conductive medium which is treated with the apparatus according to claim 28, wherein the conductive medium is blood, wastewater, a conductive solid or a suspended solid.